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Financial Regulation and Banking Sector Performance: A Comparison of Bad Loan Problems in Japan and Korea

Chan Huh and Sun Bae Kim

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We estimate the bad loan rate in Japan and Korea for 1973–1992 using data on defaults on notes issued by the corporate sector. This method exploits institutional features common in both countries which suggest a close linkage between default on notes and default on bank borrowing. Our main findings are as follows. First, the pattern of the estimated bad loan rate series generally conforms to past business cycle patterns in both countries. Second, the bad loan rate is substantially higher in Korea than Japan. Lastly, a much tighter linkage is observed for Japan between the bad loan rate and a set of plausible economic explanatory variables. We offer some interpretation for these findings.

I. INTRODUCTION

Exploring the links between a country's financial system and its real economic performance has been an increasingly active research area in recent years. One strand of the literature has focused particularly on Japan's bank-centered financial system and within it, the role of the so-called main banks in attenuating capital market imperfections and hence supporting rapid growth (e.g., Hoshi, et al., 1990, 1991). More recently, interest has extended to include other rapidly growing economies in the region, such as Korea and Taiwan (e.g., World Bank 1993).

One puzzle that emerges from this literature is that, for a subset of East Asian countries at least, which includes Japan, rapid growth occurred alongside a financial system that many would describe as "repressed;" that is, interest rates were strictly controlled and capital markets were segmented both domestically and vis-à-vis international transactions. In other words, these countries' experience seems to contradict the received wisdom that financial repression impairs efficient accumulation and allocation of financial resources and hence retards economic growth.

Was financial repression indeed costless? This paper tackles this question by indirectly assessing the cost of financial repression by comparing Japan and Korea. Although Korea clearly has followed Japan in terms of economic development, both countries experienced rapid investment-led growth spearheaded by heavy and chemical industries—Japan in the early 1960s and Korea in the 1970s—and growth was financed by a bank-centered financial system within an environment of segmented capital markets and regulated interest rates. The notable difference, however, is that Korea's banks, as government-owned institutions, were much more stringently regulated than Japanese banks, which have been privately owned. This affords an opportunity to assess whether this greater degree of regulation of banks in Korea has engendered greater costs or inefficiencies.

To the extent that industrial financing has been virtually the exclusive preserve of banks in both countries until recently, we propose to assess the relative efficiency of the two systems by focusing on the bad loan rate. The rationale is, other things equal, a more efficiently run banking

industry will engender a lower bad loan rate. A major contribution of the paper is to derive an estimate of the bad loan rate which is unavailable from published sources. To anticipate a key result of this paper, we find that the bad loan problem has been unambiguously more severe in Korea than in Japan. We attribute this difference to the lack of discretion Korean banks have had in allocating funds and their lower incentive to control bankruptcy risk through screening and monitoring corporate borrowers.

II. ESTIMATING THE BAD LOAN RATE

Measuring the bad loan rate directly is difficult for at least two reasons. First, continuous data are not available because neither Japanese nor Korean banks are required by law to report nonperforming loans. Second, for Korea, even in instances where patchy data exist, banks are bound to understate severely the true amount, since banks frequently have been required to retain nonperforming loans on their books instead of writing them off by drawing on loan loss provisions.¹

We propose to circumvent data problems on banks' (i.e., the lenders') balance sheets by turning to the (aggregate) balance sheet of the corporate sector (i.e., the borrowers). This indirect method of estimating the extent of bad loans exploits a salient feature of corporate finance common to both economies: the extensive use of notes and accounts payable (henceforth, notes), which are essentially very liquid short-term financing instruments. Why these data are useful for the stated purpose requires some elaboration.²

Table 1 shows that notes constitute a significant share of the liabilities of both Korean and Japanese firms. For the Korean manufacturing sector as a whole, notes accounted for about 27 percent of current liabilities and 17 percent of total liabilities in 1990, while the share of short-term bank borrowing was 33.5 percent and 20.6 percent, respectively. The reliance on notes is even higher in Japan, at 30 percent of total liabilities, compared to 16.7 percent for short-term bank borrowing. The share of notes in Japanese corporate liabilities is more than double the level observed in the U.S.

One important reason for the relatively heavy use of notes, especially in Korea, has been the chronic excess demand for funds in the corporate sector. Firms unable to

TABLE 1

LIABILITY STRUCTURE OF CONSOLIDATED BALANCE SHEET 1990

ITEMS	JAPAN (%)	KOREA (%)
Current liabilities	45.1	45.7
Notes payable	20.5	12.5
Short-term foreign borrowing		0.2
Short-term bank borrowing	11.5	15.3
Current maturities of long-term debt		2.8
Other short-term borrowing	1.5	2.3
Other current liabilities	10.5	12.6
Long-term liabilities	23.4	28.2
Bonds payable	7.1	7.7
Foreign debt		1.5
Long-term debt to banks	11.1	12.2
Other long-term debt	5.2	6.8
Capital	31.5	25.9
Liabilities plus Capital	100.0	99.8

NOTE: Data for Japan are from the 1990 year-end consolidated balance sheets of 96,758 firms in all industries, with aggregate assets of ¥337 trillion. Korea's data come from the 1990 year-end consolidated balance sheets of 2081 manufacturing firms, with aggregate assets of 163 trillion won.

meet their external financing requirements through bank borrowing have resorted to the issue of short-term notes to raise additional liquidity. In Japan, notes have been used relatively more intensively by the small and medium-sized firms, while in Korea, perhaps reflecting more widespread and severe credit rationing, use of notes payable appears ubiquitous across the corporate sector. Within Japanese corporate groupings (keiretsu), major firms have been providing *de facto* financing to smaller firms (typically subcontractors) by selling longer-term notes, while paying their own bills on a short-term basis (Aoki 1984). Another common reason for the intensive use of notes in Japan and Korea is the lack of a developed corporate bond or commercial paper market until recently.

Although time series data are not available for nonperforming bank loans, they are available (at a monthly frequency) for the amount of notes defaulted for both Japan and Korea. We propose that these note default data may be an unbiased indicator of the financial health of the corporate sector and, by implication, the extent of the bad loan problem in the banking sector. The reasoning becomes evident as we examine how the notes are issued, discounted, and cleared in both countries.

In Korea, firms typically issue notes on a standardized check drawn on an account at a bank with which it has

1. The Bank of Korea compensated the commercial banks by extending various forms of concessions. One common method was payment of interest to commercial banks for reserve deposits they held at the central bank, although the law did not require such payment. See Kwack and Chung (1986).

2. Descriptions of data and their sources are provided in the Appendix.

established creditworthiness through its business relationship. The maturity ranges from three to six months and, as a transferable security, the notes can be endorsed successively by several firms and are widely used as a means of payment in business transactions. Firms often sell the notes directly to banks prior to maturity at a discount, with the amount of discount equivalent to the interest charge that would accrue from the date of discount to the maturity date. Essentially similar practices apply to Japan, where it is estimated that about 25 percent of bank loan transactions in Japan take the form of discounts of notes (Ballon and Tomita 1988).³ The bulk of the notes are cleared through clearinghouses which are managed as associate institutions of the Bankers' Association.

Banks promptly report notes in default when funds in the firm's account are insufficient to cover the amount submitted for clearance. In Japan, firms that default twice within six months are subject to two years' prohibition from transactions with member financial institutions of the clearinghouse (Suzuki 1980: p.301). In Korea, although a firm with "insufficient funds" is not legally bankrupt, for practical purposes such a default almost always leads the bank to suspend business and in severe cases puts the firm into receivership for liquidation.

Given that corporate banking in Japan and Korea combines traditional lending activities with discounting and clearing of notes, a suspension of bank transactions triggered by a note default would imply that, from the bank's point of view, the overall creditworthiness of the firm in question has significantly deteriorated. In other words, movements in aggregate suspension of bank transactions due to notes defaults should be closely tied to the business sector's general financial conditions and hence the extent of the bad loan problem. It is also important to note that since no government intervention constrains this reporting procedure, note default data would not be fraught with the underreporting bias of bad loans.⁴

3. Notes are welcomed by the banks for two reasons: (i) they are self-liquidating (on the due date they are settled and the money loaned is automatically paid); (ii) when the original issuer is unable to meet the note, all subsequent endorsers (collectively) are also liable to the bank for the face value of the note (Kitagawa 1984). Japanese banks have an added motive. In the process of clearing these notes, banks can collect valuable up-to-date information on the general health of their corporate clients.

4. Additionally, since the bank acts purely as an agent and not as a fiduciary as in the case of loan arrangements, there is little scope or incentive for the banks themselves to under or overreport the incidence or the amount of note default.

Bad Loan Estimate: Japan

To ascertain more formally the link between defaults on notes and the severity of problem loans in the corporate sector, we first estimated a simple regression; the dependent variable is (changes in) the aggregate liability of bankrupt enterprises (*BANKLIAB*) and the explanatory variable is (changes in) the aggregate liability of firms whose business transactions with banks were suspended due to note default (*SUSPLIAB*).⁵ The results are reported in Table 2. A high correlation is observed between these two variables, with *SUSPLIAB* statistically significant at the 1 percent level and explaining almost 90 percent of the year-over-year changes in the aggregate liability of bankrupt firms.

We also regressed *BANKLIAB* on GNP growth instead of *SUSPLIAB* to see the extent to which fluctuations in aggregate growth explain changes in corporate bankruptcy. The coefficient on GNP is negative and statistically significant; that is, higher output growth is associated with lower corporate bankruptcy. However, GNP growth explains only 38 percent of the changes in corporate bankruptcy. Moreover, its explanatory power does not appear robust. When GNP and *SUSPLIAB* are both included as explanatory variables, the former loses statistical significance while the latter retains it.

Having established that *SUSPLIAB* provides a good gauge of the corporate sector's overall financial health, we now turn to the task of actually measuring the extent of the bad loan problem in Japan. For any given quarter, t , we estimated the bad loan rate (*BLR*) by applying the following formula:

$$(1) \quad BLR_t^J = \left(\frac{BL_t}{BB_t} \right) = \left(\frac{SUSPLIAB_t}{TOTLIAB_t} \right)$$

where *BL* is the level of bad loans, which is unobserved, *BB* is the aggregate outstanding balance of short-term plus long-term bank borrowing, *TOTLIAB* is the aggregate liability of the corporate sector and, as before, *SUSPLIAB* is the combined liability of firms with suspended business transactions with banks due to defaulting on notes. The intuition underlying this equation is straightforward: The proportion of problem loans to total loans is the same as the proportion of liabilities accounted for by firms with suspended transactions with banks to the aggregate liability of all firms. The key underlying assumption, to

5. It would be reasonable to expect that movements in *BANKRTLIAB* would closely track changes in the aggregate level of bad loans. However, these data are available only on an annual basis.

TABLE 2

RELATIONSHIP BETWEEN CORPORATE BANKRUPTCY AND SUSPENSIONS OF BUSINESS TRANSACTIONS WITH BANKS, JAPAN
1968.Q2–1992.Q4

DEPENDENT VARIABLE	EXPLANATORY VARIABLE	COEFFICIENT	ADJUSTED R^2	D.W.	P. VALUE OF Q
<i>BANKRLIAB</i>	<i>SUSPLIAB_t</i> <i>SUSPLIAB_{t-1}</i>	1.01*** 0.43	0.89	2.5	0.17
<i>BANKRLIAB</i>	<i>GNP_t</i> <i>GNP_{t-1}</i>	-0.98*** 2.2	0.38	1.9	0.75
<i>BANKRLIAB</i>	<i>GNP_t</i> <i>GNP_{t-1}</i> <i>SUSPLIAB_t</i> <i>SUSPLIAB_{t-1}</i>	0.13 -0.04 1.07*** 0.17	0.89	2.6	0.68

NOTE: *BANKRLIAB* is the total liability of the firms that went bankrupt in a given year, *SUSPLIAB* is the aggregate liability of firms whose business transactions with banks have been suspended due to defaulting on notes, and *GNP* is the real year-over-year growth rate of GNP. All series are logged and first differenced; *** denotes a marginal significance level of 1 percent.

reiterate, is that firms that default on notes are also likely to be the ones defaulting on bank loans.⁶

Figure 1 presents the estimated bad loan rate (*BLR*) for Japan for the sample period of 1973 to 1992.⁷ Three noteworthy patterns emerge in the series. First, the bad loan rate rose sharply during the 1970s. It first peaked in 1974 at about 1.5 percent, in the wake of monetary and fiscal tightening in early 1973 geared to restrain inflation and the October 1973 oil crisis. The rate rose to yet higher levels in 1977, apparently reflecting the slump in export-dependent industries triggered by a sharp appreciation of the yen.⁸

Second, the series does not exhibit any discernible trend from the late 1970s through the mid-1980s. That is, no marked increases in bad loan problems appear to have been triggered by the second oil shock in 1979, the recession of the early 1980s, or the sharp appreciation of the yen after the Plaza Accord of 1985.

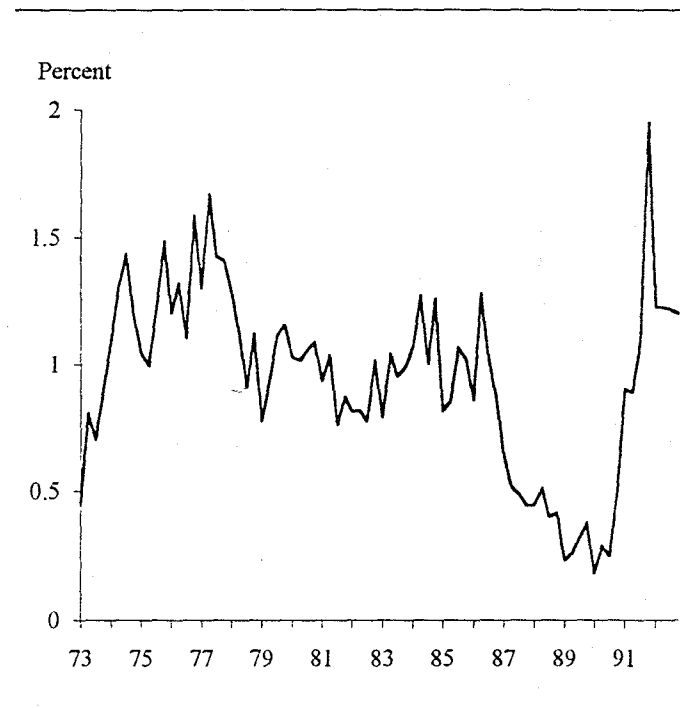
6. Our estimate might overstate somewhat the actual magnitude, to the extent that banks generally secure loans with some tangible asset and recover some of the loan after the eventual liquidation.

7. Our sample begins in 1972 and not earlier because the Bank of Japan changed the reporting criteria for note default in October 1971. See *Economic Statistics Monthly*, November 1971.

8. The yen/dollar exchange rate appreciated from about 290 at the beginning of 1977, to a peak of 170 in October 1978.

FIGURE 1

BAD LOAN RATE ESTIMATE: JAPAN



Third, the bad loan rate declined markedly during the bull market (the so-called bubble economy) of the second half of the 1980s, reaching a low of 0.25 percent at the end of 1989. The rate then sharply reversed trend, soaring to an all-time high of nearly 2 percent in 1991. This surge coincides with the steep decline in asset prices since late 1989 and the onset of Japan's current recession, which many now consider the most severe in the postwar period. Our estimate of the bad loan problem corroborates this view in a striking way. The severity of problem loans appears to have subsided somewhat in 1992 but no definitive statement can be made without more up-to-date data.

It is important to note that our estimates are of new bad loan rates for each year. To the extent that banks may carry some or even a substantial part of bad loans from previous periods over time, the actual bad loan rate may be better approximated by a cumulative measure. To explore this possibility, we cumulated the bad loan estimate from 1990.Q1 to 1992.Q4, the latest period for which data are available. The rationale for this experiment is to see how severe the current bad loan problem is in Japan, assuming that banks have not been able to write off any portion of nonperforming loans since 1990.⁹ According to this worst possible scenario, bad loans in Japan would have totaled some ¥43.8 trillion, or 10.4 percent of total outstanding (short-term plus long-term) bank loans at the end of 1992. This estimate is remarkably close to some private sector estimates reported in the financial press in recent months.¹⁰

Bad Loan Estimate: Korea

Due to the lack of data on liabilities of suspended firms (*SUSPLIAB*), the bad loan rate for Korea was estimated using a slightly different equation:

$$(2) \text{BLR}_t^K = \left(\frac{\text{BL}_t}{\text{BB}_t} \right) = \left(\frac{\text{DEFNOTE}_t}{\text{TOTNOTE}_t + \text{DEFNOTE}_t} \right)$$

where *DEFNOTE* is the aggregate value of defaulted notes and *TOTNOTE* is the total amount of notes outstanding.

9. According to Japanese practices, loans are not considered delinquent until six months without a payment, and even then a bank may accept a token payment, so the troubled debt may ride another six months. The implicit assumption here is that prior to 1990, Japanese banks were capable of writing off bad loans. The situation changed after the onset of the steep decline in asset prices; it wiped out a significant portion of banks' hidden reserves, which otherwise could have been used to write off bad loans. For further details on the effect of stock price movements on Japanese bank capital and lending, see Kim and Moreno (1994).

10. Many financial analysts maintain that, by U.S. standards, total bad loans in Japan may be as high as ¥30 trillion. See *Wall Street Journal*, January 20, 1994.

The equation simply states that the bad loan rate is equal to the rate of default on notes issued.^{11,12} Again, as in Japan, this method of estimating the bad loan rate rests on the premise that firms that default on notes also are likely to be the ones defaulting on bank loans.

Figure 2A shows the estimated bad loan rate for Korea.¹³ Several noteworthy patterns emerge. First, Korea's bad loan rate is significantly higher than Japan's estimate—typically more than double—and is also more volatile. We will discuss possible reasons for this in Section III.

Second, as in Japan, a local peak in bad loans occurred after the first oil shock. Unlike Japan, however, the bad loan problem appears to have been most severe in the early 1980s, with the rate exceeding 7 percent at its peak in 1981–1982. This surge in bad loans can be reconciled with several adverse shocks to the Korean economy around that time. For one, Korea's GNP shrank by almost 5 percent as a result of the drought-induced recession of 1980. Weak domestic economic conditions were compounded by the world recession after the second oil shock, pushing many highly leveraged firms into insolvency.¹⁴

Third, as in Japan, the bad loan rate trended downward in the second half of the 1980s, though in Korea's case the decline was punctuated by a minor surge in 1987. This surge coincides with the well-known episode in 1987 when many Korean construction companies went bankrupt as a result of cancellations of large overseas contracts.

11. The Bank of Korea's *Financial Statement Analysis* does not provide data on notes issued for all industries. We therefore estimated *TOTNOTE* by summing notes issued in manufacturing, construction, wholesale, retail, and electricity. These industries collectively accounted for about 90 percent of total corporate bank borrowing. By contrast, *DEFNOTE* data pertain to defaulted notes in all industries. Therefore, our estimate of the default rate on notes has a slight upward bias.

12. As noted earlier, unlike other forms of liability, such as bank borrowing, bad notes are netted out of total notes outstanding (*TOTNOTE*) quite promptly. We added *DEFNOTE* to the denominator since dividing by *TOTNOTE* alone, which is a net amount, would yield an overestimate of the extent of the bad loan rate.

13. The sample begins in 1973 because of limited data availability for earlier years and a sharp break in the data due to the Presidential Emergency Decree in 1972. The Decree essentially came in response to widespread financial distress in the corporate sector in the early 1970s. To lighten the corporate debt burden, the government placed a moratorium on all loans in the informal credit market (curb market) and slashed the bank loan rate from 23 percent per annum to 15.5 percent, when the inflation rate was as high as 16 percent. The Decree also converted approximately 30 percent of high interest rate short-term commercial bank loans into long-term loans at concessional rates.

14. Industries that were particularly hard hit during this time included overseas construction, shipping, textile machinery, and lumber. Concern over unemployment and financial instability prompted the government to bail out many of these troubled firms. See Cho and Kim (1993) for details.

Finally, as in Japan, Korea's bad loan rate increased sharply in 1990, reaching a level comparable to that observed in the early 1980s. Part of the increase may be attributed to the cyclical downturn in the Korean economy in 1992, when GNP growth slowed to 4.6 percent. But the cyclical downturn alone cannot account for the jump in the bad loan rate. For one, the slowdown in 1992, albeit the worst since 1980, was relatively mild compared to the recession of 1980, or to Japan's current recession. Moreover, the Korean economy has not been plagued by a drastic asset price deflation as in Japan. These observations suggest that the recent surge in Korea's bad loan problem may reflect more fundamental factors, which we explore in the next two sections of the paper.

We noted earlier that our estimated series, which are net annual rate, may significantly understate the actual extent of the bad loan problem if banks are constrained in writing them off in a timely manner. This discrepancy is likely to be especially sizeable in Korea since, under government directives, banks usually have been carrying large amounts of nonperforming loans on their books over very long periods.

Figure 2B presents the cumulative bad loan rate under two alternative scenarios. First, we derived an upper bound

estimate using an average annual write-off rate of 5 percent, i.e., we cumulated 95 percent of new bad loans each year over the entire sample period 1973.Q1–1992.Q4. This series is represented by the solid line in Figure 2B. To derive a lower bound estimate, we employed an arbitrary average annual write-off rate of 10 percent. This series is represented by the dotted line.

According to the upper bound estimate, the cumulative bad loan rate climbed steadily from the early 1970s to a peak of 36.7 percent in 1984.Q1. The situation eased somewhat during the balance of the 1980s, but then deteriorated sharply after 1990.Q3. As of 1992.Q4, some 36.7 percent of total outstanding loans in Korea were nonperforming. Carrying out the same exercise using the annual write-off rate of 10 percent yields essentially a similar pattern, though the estimated cumulative rate is, of course, lower, at 26.5 percent in 1983.Q4 and 27.1 percent in 1992.Q4. By either measure, however, the bad loan problem in Korea appears significant both in absolute terms and relative to Japan.

Are these high bad loan rates indeed plausible? Chung's (1991) study, which is based on internal Bank of Korea data, allows a partial check for the benchmark year of 1988. For purposes of comparison, Table 3 reproduces his

FIGURE 2A

BAD LOAN RATE ESTIMATE: KOREA

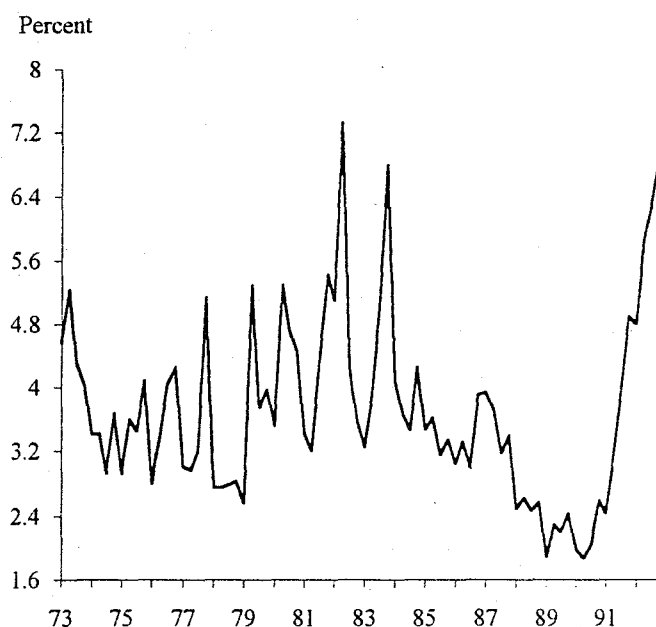


FIGURE 2B

CUMULATIVE BAD LOAN RATE: KOREA

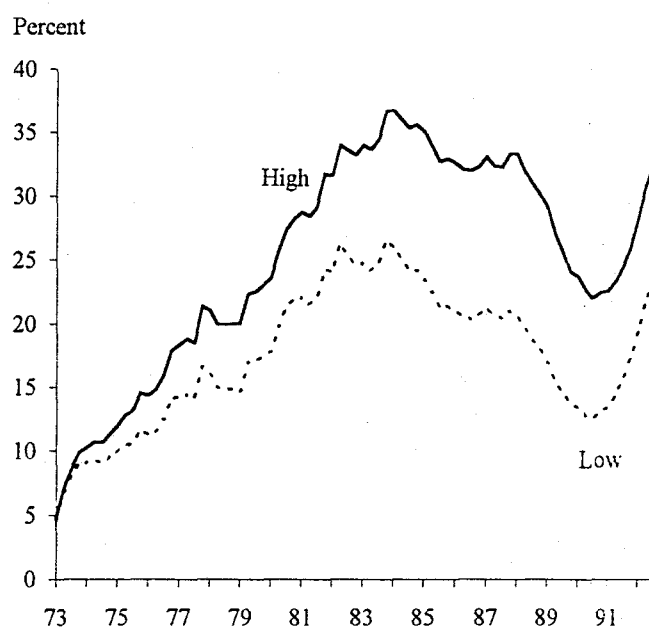


TABLE 3

NONPERFORMING LOANS OF MAJOR KOREAN COMMERCIAL BANKS
1988

BANKS	TOTAL CREDIT AND DISCOUNT	PERFORMING LOANS	NONPERFORMING LOANS BY TYPE					
			Type A	Type B		Total		
			Amount	%	Amount	%	Amount	%
Group I	5,502	4,041	335	6.1	1,125	20.5	1,461	26.5
Group II	447	401	3	0.6	43	9.6	46	10.2
Total	5,949	4,443	338	5.7	1,168	19.6	1,507	25.3

SOURCE: Chung (1991 Table 1-1, p. 16).

NOTE: Data other than percent are in billion won. Type A refers to loans that are almost surely not recoverable; Type B are loans with over three month's delay in payment or loans to firms with sufficient deterioration in credit quality to warrant explicit loan principal recovery measures.

main results. Chung's sample consists of eight major nationwide banks divided into two groups. Group I consists of six banks that have been in business since the 1950s or 1960s, and Group II is made up of two newer banks established in the early 1980s. Problem loans also are reported in two categories. Type A are loans whose probability of repayment is virtually nil, and Type B includes loans with over three months' delay in payment and loans extended to companies whose credit conditions have deteriorated so markedly as to warrant explicit loan principal recovery measures.

Based on the strictest definition (i.e., Type A), some 5.7 percent of the total sample of eight banks' outstanding loans as of year-end 1988 were bad loans. When the broader definition of problem loans are added (Type B), the bad loan rate swells to 25.3 percent. The bad loan problem appears significantly more severe for Group I banks, which are older and hence more exposed to bad loan overhang problems. By contrast, Group II banks have had the benefit of a relatively clean slate. These newer banks, however, cannot be taken as representative of Korea's banking industry.

Our estimates of the cumulative bad loan rate appear reasonably close to Chung's. As of 1988.Q4, our bad loan rate was 17.9 percent using the 10 percent write-off rate and 30.2 percent using the 5 percent write-off rate. It would appear, therefore, that for 1988 at least, the (broadly measured) actual bad loan rate falls between the lower and upper bounds of our cumulative estimate. We have no reason to believe that this should not hold for other years as well.

III. WHY HAVE BAD LOAN RATES BEEN HIGHER IN KOREA?¹⁵

The modern theory of financial intermediation emphasizes the special role of banks as information producers. By acting as delegated monitors on behalf of numerous and scattered depositors, banks eliminate needless duplication of monitoring which is costly (Diamond 1984). Also, given the public goods aspect of monitoring, delegating the task to one intermediary potentially can help avoid the free-rider problem that arises when many lenders finance a single borrower. We say potentially because, as Diamond pointed out, banks themselves must be provided with proper incentives to monitor. Depositor discipline is one incentive against banks that shirk on monitoring.¹⁶ Another is for the bank to hold a substantial share of a borrower's debt so that it internalizes a substantial portion of the externality generated by its monitoring.

15. The mean bad loan rate estimate for the sample period 1973.Q1–1992.Q4 was 3.9 percent for Korea and 0.9 percent for Japan, with standard deviations of 1.5 percent and 0.4 percent, respectively. To see whether the difference between the two estimates is different from zero with a statistical significance, the following tests were carried out. First, the difference between the two series (i.e., $diff_t = BLR(Korea) - BLR(Japan)$) is calculated. Second, various univariate autoregressive regressions with a constant term are run using the $diff_t$ series. Then the statistical significance of the constant term is examined. For AR(1) through AR(6) specifications, the constant term remains positive and significant at the significance level of 10 percent or less.

16. To the extent that a bank holds a diversified loan portfolio, its overall return will serve as a relatively noiseless signal of the level of monitoring effort. This, in turn, enables depositors to induce banks to monitor efficiently.

Both Japan and Korea have relied intensively on the banking sector to finance growth. The banking sector's incentive structure to screen and monitor borrowers, however, appears to have diverged significantly between the two countries.

For Japan, a large number of studies suggest that its banking system, in particular the so-called main banking system, has been highly effective in mitigating informational and other imperfections in capital markets (e.g., Aoki, et al., 1993, Hoshi, et al., 1990, 1991, Kim 1993, and Lichtenberg and Pushner 1992). A distinguishing feature of the main banking system is that although the main bank identified with a particular firm that is not its sole lender, it is usually the only bank that undertakes the task of monitoring.¹⁷ Two additional features of the system suggest that powerful incentives were present for the main bank to be diligent in carrying out this task.

First, if a firm monitored by a given main bank faces financial distress, that main bank is also expected to assume the bulk of the burden in restructuring it or bailing it out. If conditions are sufficiently bad to warrant bankruptcy, the main bank usually absorbs a larger proportion of losses than its loan share.¹⁸ Bearing this disproportionate burden when projects go awry would act as an effective deterrent against shirking on monitoring.¹⁹ Second, the main bank also faces positive incentives to monitor due to the claims structure it holds: The main bank typically not only is the largest lender, but also is an important shareholder, usually the largest among banks. Presumably, the large debt and equity stakes that the main bank simultaneously holds help it internalize a significant part of the externalities associated with monitoring the firm.²⁰

As in Japan, banks have played a dominant role in financing Korea's economic growth. This came about largely as a result of conscious policy design. Following Japan's model in the 1960s, the Korean authorities sought to use the banking sector as a conduit of preferential credit

to sectors deemed strategic to Korea's economic growth.²¹ The use of preferential access to credit at subsidized interest rates (known as "policy loans") intensified in the 1970s when the government made a major push to establish a heavy and chemical industries (HCI) sector in Korea.²² According to one estimate, policy loans on average accounted for over 65 percent of all bank loans in 1973–1981 (Cho and Kim 1993). The actual share of government-directed loans would be even higher if one included loans that were not extended through explicitly earmarked programs and hence were more difficult to measure.²³

Compared to Japan, the Korean government appears to have wielded a much more direct control and much tighter control over the banking sector. Most notably, unlike in Japan, the Korean government until recently has been the major shareholder in all major Korean banks. This has had far-reaching ramifications on how the banking system has operated. To quote Cho and Kim (1993, pp. 51–52): "The banking system was used as the government's treasury unit to finance development projects to manage risk sharing of the economy and bankers were treated as civil servants. Their performance was evaluated based on their compliance to the government guidance rather than their efficient management of assets and liabilities."

Tight government control of the banking sector gave rise to two types of moral hazard problems in Korea's credit markets. On the supply side, banks had little discretion or incentive to control risk by screening projects and monitoring corporate performance. Declaring any sizeable industrial enterprise as bankrupt or writing off bad loans on

17. Main banking therefore has been characterized by Sheard (1989) as a system of "delegated monitor among monitors," in contrast to Diamond's (1984) model where monitoring is delegated by depositors to an intermediary.

18. This is extensively documented in case studies by Sheard (1985, 1989).

19. This immediately raises the question: What prevents the main bank from renegeing on this commitment? One possible explanation is that banks enter into arrangements for reciprocal delegated monitoring as well as for reciprocal subordination in financial distress, with loss of reputation as a deterrent against defection (Aoki, et al., 1993).

20. Kim (1993) provides a more detailed analysis on this and related issues.

21. It was not until the early to mid-1980s when nonbank financial institutions (NBFIs) emerged as an important alternative source of financing in addition to the traditional commercial bank and curb markets. For overviews of the postwar Korean financial system and policies, see Kang (1990), Kwack and Chung (1986), Hong and Park (1986), Cho and Kim (1993), and Cho and Cole (1992).

22. The government also used the banking system to guarantee foreign financing of investments in HCI. Foreign loans accounted for a sizeable share of external funds of Korea's corporate business sector, averaging 37.9 percent of the total in 1965–1969, 23.3 percent in 1970–1974, and 20.4 percent in 1975–1979. As the capital-intensive HCI investment drive waned and supplies of loans from foreign banks dwindled, the share of foreign loans declined sharply to 6 percent in the first half of the 1980s.

23. Another way to assess the relative importance of policy loans is to look at the sectoral allocation of credit. According to Cho and Kim (1993, p.39), the manufacturing sector received 46 percent of total domestic bank loans in 1970, while its contribution to GDP was only 21.3 percent. Within manufacturing, HCI accounted for 22.6 percent of total bank loans, while its GDP share was only 8.5 percent. By 1980, HCI's share of total bank credit increased to 32.1 percent while its GDP share increased to 16.5 percent. This reflects in part the longer gestation period of HCI investment.

banks' balance sheets required the explicit consent of the government. In practice, the government averted bankruptcy at large enterprises by directing banks to provide relief loans or rescheduling debt.

Extreme control and guidance of banking institutions had adverse incentive effects on the demand side of the loan market as well. The socialization of bankruptcy risk, combined with the strict low interest rate ceilings, made the cost of debt financing very cheap for firms in the targeted sectors.²⁴ This encouraged firms to take on excessively high levels of debt. According to data in the Bank of Korea's *Financial Statement Analysis*, the rate of total liability to net worth in Korean manufacturing more than quadrupled, from about 84 percent in the mid-1960s to over 365 percent in the late 1970s.

High leveraging made the corporate sector as a whole very vulnerable to external shocks and economic fluctuations. This problem grew to especially alarming proportions by the end of the 1970s, as excessive investment in HCI bred large idle capacities, and enterprises began encountering difficulties servicing their debt.²⁵ The government responded by taking greater involvement in banks' credit allocation to bail out troubled firms and industries, with the result that banks were saddled with ever growing amounts of de facto nonperforming loans.²⁶

Mounting problems in the financial sector prompted the Korean government to reorient its policies in the early 1980s toward giving banks greater discretion in setting interest rates and allocating loans. To this end, the government began divesting its shareholding in commercial banks and established the so-called principal transaction bank system. The system sought to regulate bank credit extended to large corporations through their principal transaction banks. The basic aim was to reduce corporate leverage and to improve the quality of monitoring of the financial conditions and investment activities of corporations.²⁷

Pervasive government control of the banking sector persists, however. Interest rates at all banks are still regulated. Banks that are saddled with high proportions of nonperforming loans continue to depend on the Bank of

Korea for low-cost funds to support their outstanding loans, the bulk of which are still policy-related. This has left banks little choice but to heed government directives even though they have nominally shifted to private ownership (Cho and Cole 1992). Finally, an autonomous bank-customer relationship has yet to develop in Korea due to continued government intervention in credit allocation. As a result, principal transactions banks have had little incentive to monitor corporations. Nor has a principal transaction bank's evaluation of a corporate investment and financing plan had any significant effect on corporate behavior (Nam and Kim 1993).

To summarize, our review of the Japanese and Korean banking system highlights a fundamental difference. In Japan, the cost of corporate bankruptcy ultimately fell onto the (main) banks. The internalization of bankruptcy costs would have induced banks to be diligent in controlling bankruptcy risk through screening corporate borrowers as well as investment projects. Additionally, as significant corporate shareholders, Japanese banks also would have a strong incentive to monitor corporate performance on an ongoing basis. By contrast, these private incentives were muted in Korean banks due to the government ownership of banks until recently and due to continued heavy intervention despite nominal privatization. Other things equal, this lower incentive faced by Korean banks to monitor undoubtedly accounts for a significant part of the higher bad loan rate estimated for Korea.

IV. DETERMINANTS OF THE BAD LOAN RATE

Our institutional explanation of the higher bad loan rate in Korea assumes the usual ceteris paribus condition. This section attempts a more systematic way to control for factors other than different monitoring incentives that may account for the observed difference in bad loan rates between Japan and Korea. To implement this idea statistically, we estimated the following regression,

$$BLR_t = \alpha_t + \sum_{j=1}^n \sum_{i=1}^l \beta_i^j x_{t-i}^j + \epsilon_t$$

where x is a set of economic variables (with lag structure denoted by l , $l=4$ for Japan, $l=6$ for Korea) that plausibly will affect the bad loan rate in the economy.²⁸ We estimated three models. The first model consisted only of financial variables derived from the aggregate balance sheet. For both Japan and Korea, these variables were the aggregate leverage ratio of the corporate sector, defined as the ratio of

24. According to Cho and Cole (1992), the real cost of bank credit was negative throughout most of the 1970s.

25. Cho and Kim (1993) estimate that almost 80 percent of all fixed investment in the manufacturing sector during the late 1970s was directed to HCI. Many subscribe to the view that this was an overinvestment. See for example Hong (1979), Amsden (1989), and Stern et al., (1992).

26. The launch into HCI itself was preceded by a major government bail out of the corporate sector which already was highly leveraged. See footnote 14.

27. See Nam and Kim (1993) for a detailed analysis of this system.

28. In addition to the variables listed in (1), the proper number of lagged dependent variables were added to remove serial correlations. Also an intercept dummy variable was added in the three equations for Japan to

total liabilities to total assets, the ratio of bank borrowing in total liabilities, and the growth rate in bank loans. The second model included "real" macroeconomic variables. For Japan, the set consisted of the Nikkei stock market index, real GDP growth rate, the nominal yen-dollar exchange rate, oil price, and the variability in industrial production growth. The Korean equation did not include a stock market index and used the real instead of nominal won-dollar exchange rate.²⁹ The third model included both sets of financial and real variables.

The motivation underlying this exercise is simple. If our hypotheses on the behavior of Japanese and Korean banks are correct, and if our estimate of the bad loan rate is reasonably accurate, then we would expect the regression equation to be statistically more significant in Japan compared to Korea. The rationale is that because of lower incentives facing Korean banks to control risk through screening and monitoring corporate borrowers, the conventional explanatory variables will explain less of the movement in the Korean bad loan rate. Alternatively, one can think of the adverse incentive effects on banks as forcing the economy to operate inside the risk-return efficiency frontier, thereby loosening the link between the bad loan rate and the explanatory variables.

As evident in Table 4 which reports the results for Japan, the exclusion tests are generally significant for all three models, with roughly 75 to 80 percent of changes in the bad loan rate explained by the right hand side variables. In the model featuring financial variables alone, individual exclusion tests show that leverage and loan growth are statistically significant in explaining changes in the bad loan rate, while the rate of bank borrowing to total liability is not. A joint exclusion test of the three balance sheet variables, however, is significant at the 5 percent level.

Four out of the five variables in the second model—the Nikkei index, GDP growth, oil price, and the variability in industrial production—are all statistically significant. The joint exclusion test of all five real macroeconomic variables is also significant at the 1 percent level. The third model performs the best, suggesting that both financial and real variables are relevant, and hence both sets should be included.³⁰

account for the level shift in the break in the key data at 1971.Q4. This is done to allow for a major accounting rule change regarding suspension and bankruptcy in late 1971.

29. This helps account for the much larger inflation differential that prevailed between Korea and the U.S. than Japan and the U.S. Also, for Korea, we did not include a stock market index variable because the market was underdeveloped until at least the mid-1980s.

30. We also ran the same set of regressions limiting the sample period up to the end of 1989, i.e., we excluded the period of the steep asset price

TABLE 4

EXCLUSION TESTS OF EXPLANATORY VARIABLES
OF THE BAD LOAN RATE, JAPAN
1968.Q2–1992.Q4

	MODEL SPECIFICATIONS		
	Financial Variables Only $j = 1, 2, 3$	Real Variables Only $j = 4, 5, 6, 7, 8$	Financial and Real Variables $j = 1-8$
ADJUSTED R^2	0.74	0.77	0.80
EXCLUDED VARIABLES:	Exclusion test: $H_0: \beta_i = 0$ for all i 's and j 's		
1. <i>LEV</i>	0.01		0.01
2. <i>BB</i>	0.66		0.49
3. <i>LOANGR</i>	0.08		0.65
4. <i>NIKKEI</i>		0.09	0.08
5. <i>GDPGR</i>		0.00	0.04
6. <i>FOREX</i>		0.31	0.17
7. <i>OIL</i>		0.05	0.04
8. <i>IPVAR</i>		0.14	0.36
1, 2, 3	0.02		0.03
4, 5, 6, 7, 8		0.01	0.00
1-8			0.00

NOTE: The dependent variable *BLR* is the estimated bad loan rate. The explanatory variables are: leverage ratio (*LEV*), bank borrowing to total liability ratio (*BB*), loan growth rate (*LOANGR*), Nikkei stock market index (*NIKKEI*), real GDP growth rate (*GDPGR*), nominal yen-dollar exchange rate (*FOREX*), oil price (*OIL*), and variability in industrial production growth (*IPVAR*), defined as the standard deviation of the quarterly industrial production growth rate over the immediately preceding three years. For *NIKKEI*, *FOREX*, and *OIL*, we used year-over-year growth rates. Four lags of all explanatory variables were used except for *IPVAR* (one lag). To correct for serial correlation, the right-hand-side also included the dependent variable lagged up to four quarters. To control for the change in the Bank of Japan's reporting procedure in 1971 on notes default data, we also included dummy variables (not reported), with $D = 1$ for $t = 1968.Q1$ to $1972.Q4$, and $D = 0$, otherwise.

The regressions for Korea are reported in Table 5. One immediately notes the significantly lower adjusted R^2 in Korea, ranging from 0.62 to 0.68. The exclusion test corroborates the poor fit. In the first model, which is restricted to financial variables, only leverage is significant (at the 5 percent level); the joint exclusion test statistic is

deflation and the current recession. Interestingly, the exclusion test for the Nikkei was not statistically significant for this shorter sample period, while that for the variability in industrial production was. The main thrust of the results did not change, however.

only marginally significant at 0.10. None of the variables in the second model is statistically significant, either individually, or jointly. As was the case for Japan, combining the two sets of variables does improve the result somewhat, with the joint exclusion test for the financial variables significant at 5 percent and that for all seven variables significant at 10 percent. Overall, however, it is safe to say that all models fare considerably less well for Korea.

TABLE 5

EXCLUSION TESTS OF EXPLANATORY VARIABLES
OF THE BAD LOAN RATE, KOREA
1973.Q1–1992.Q4

$BLR_t = \alpha_t + \sum_{j=1}^n \sum_{i=1}^6 \beta_i^j x_{t-i}^j + \epsilon_t$			
	MODEL SPECIFICATIONS		
	Financial Variables Only $j=1,2,3$	Real Variables Only $j=4,5,6,7$	Financial and Real Variables $j=1-7$
ADJUSTED R^2	0.63	0.62	0.68
EXCLUDED VARIABLES:	Exclusion test: $H_0: \beta_i^j = 0$ for all i 's and j 's		
1. LEV	0.02		0.06
2. BB	0.49		0.97
3. LOANGR	0.13		0.01
4. GDPGR		0.31	0.22
5. RFX		0.55	0.04
6. OIL		0.96	0.38
7. IPVAR		0.76	0.49
1, 2, 3	0.10		0.03
4, 5, 6, 7		0.85	0.20
1-7			0.09

NOTE: The dependent variable *BLR* is the estimated bad loan rate. The explanatory variables are: leverage ratio (*LEV*), bank borrowing to total liability ratio (*BB*), loan growth rate (*LOANGR*), real GDP growth rate (*GDPGR*), real won-dollar exchange rate (*RFX*), oil price (*OIL*), and variability in industrial production growth (*IPVAR*), defined as the standard deviation of quarterly industrial production growth rate over the immediately preceding three years. Six lags of all explanatory variables were used except for the *IPVAR* (one lag). To correct for serial correlation, the right-hand-side also included the dependent variable lagged up to six quarters.

IV. CONCLUSION

We attempted to measure the bad loan rate based on indirect data for Japan and Korea to shed some light on the implications of different institutional and risk-sharing arrangements observed in the two economies. The estimated

measure appears to be a reasonable approximation based on several grounds. First, there is a general conformity between the overall pattern of our measure to the past business cycle patterns of the two economies. Although the empirical relationship is weaker for Korea than for Japan, the bad loan measure for Korea still seems to behave in a reasonable manner following identifiable shocks. Second, our estimate matches quite closely an independent study that measures the bad loan rate directly for Korea in 1988 and 1989. Third, consistent with our expectation, the bad loan rate estimate is substantially higher in Korea than in Japan. Finally, a much tighter linkage is observed between the bad loan rate estimates and a plausible set of economic variables for Japan. These results, in turn, suggest that while banks can make a substantial contribution to economic growth, heavy government intervention also can substantially impair banks' incentive to monitor and control risk. The higher bad loan rate in Korea is but one manifestation of the associated costs of "unduly" repressing the banking system. Our estimate reveals, especially in the case of Korea, that such costs can be substantial.

APPENDIX

Data Sources

Data for Japan were collected from the *Quarterly Report of Incorporated Enterprise Statistics*, published by the Ministry of Finance (MOF). The *Report* provides aggregated quarterly balance sheet data for manufacturing and non-manufacturing firms, excluding financial institutions and insurance companies. The sample consists of 1,850 firms with capital in excess of ¥10 million, which would include most of Japan's publicly listed firms, and 15,000 firms drawn from various size groups below the ¥10 million capital threshold. The *Report* therefore provides a fairly comprehensive coverage of the entire spectrum of Japan's corporate sector.

Data for Korea were collected from *Financial Statement Analysis*, published annually by the Bank of Korea (BOK). This data source is ideally suited for purposes of comparison with Japan since it is modeled closely after the MOF *Report* both in its method of collection and the variables covered. The BOK's sample consists of some 1,400 firms with the number split roughly evenly between small and large enterprises (listed or unlisted, with capital in excess of W10 billion). One notable difference is that the Korean data are only available on an annual basis. We therefore estimated quarterly data series by interpolation between two annual data points. Table 1 presents an example of typical balance sheet data that are used.

Data on the default rates on the business notes and outstanding loans were compiled from monthly issues of *Economic Statistics Monthly* (BOJ), and *Monthly Statistical Bulletin* (BOK). Monthly series were aggregated to derive quarterly series (business note default) and end of quarter (outstanding loan and discount) data.

Japanese data on notes payable are not reported separately from accounts payable in MOF's *Quarterly Report of Incorporated Enterprise Statistics*. We estimated notes payable by using aggregate corporate sector balance sheet data which report these items separately. We computed the ratio between the two and multiplied it to the MOF series to arrive at an estimate of notes payable.

REFERENCES

- Amsden, Alice. 1989. *Asia's Next Giant*. New York: Oxford University Press.
- Aoki, Masahiko. 1984. "Aspects of the Japanese Firm." In *The Economic Analysis of the Japanese Firm* ed. M. Aoki, pp. 3-43. New York: North Holland.
- _____, Hugh Patrick, and Paul Sheard. 1993. "The Japanese Main Bank System: An Introductory Overview." Paper prepared for the Conference for the joint research project on the Japanese Main Bank System and its Relevance for Developing Market and Transforming Socialist Economies, April 1993, Stanford University.
- Ballon, R.J., and I. Tomita. 1988. *The Financial Behavior of Japanese Corporations*. New York: Kodansha International.
- Bank of Japan. Various issues. *Economic Statistics Monthly* (Tokyo).
- Bank of Korea. Various issues. *Financial Statement Analysis* (Seoul).
- _____. Various issues. *Monthly Statistical Bulletin* (Seoul).
- Cho, Yoon-Je, and Joon-Kyung Kim. 1993. "Credit Policies and Industrialization of Korea." Paper prepared for the World Bank research project on the effectiveness of credit policy in East Asia.
- _____, and David C. Cole. 1992. "The Role of Financial Sector in Korea's Structural Adjustment." In *Structural Adjustment in a Newly Industrialized Country: The Korean Experience* ed. Vittorio Corbo and Sang-Mok Suh. Baltimore, MD: Johns Hopkins University Press for the World Bank.
- Chung, Un Chan. 1991. *Financial Market Reform* (in Korean). Seoul: Bupmun-sa.
- Diamond, D. 1984. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies* 51, (July) pp. 393-414.
- Hong, Wontack. 1979. *Trade, Distortions and Employment Growth in Korea*. Seoul: Korea Development Institute.
- Hong, Wontack, and Yung Chul Park. 1986. "The Financing of Export-Oriented Growth in Korea." In *Pacific Growth and Financial Interdependence*, ed. Augustine H.H. Tan and Basant Kapur, pp. 163-182. Boston: Allen & Unwin.
- Hoshi, T., A. Kashyap, and D. Scharfstein. 1991. "Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups." *Quarterly Journal of Economics* 106, (Feb.) pp. 33-60.
- _____. 1990. "The Role of Banks in Reducing the Costs of Financial Distress in Japan." *Journal of Financial Economics* 27, (Sept.) pp. 67-88.
- Kang, Moon-Soo. 1990. "Money Markets and Monetary Policy in Korea." Working Paper No. 9020. Seoul: Korea Development Institute.
- Kim, Sun Bae. 1993. "Why Do Japan's Main Banks Hold Corporate Shares?" mimeo, Federal Reserve Bank of San Francisco.
- _____, and Ramon Moreno. 1994. "Stock Prices and Bank Lending Behavior in Japan." Federal Reserve Bank of San Francisco *Economic Review* (forthcoming).
- Kitagawa, Z. (ed.) 1984. *Doing Business in Japan*. New York: Matthew Bender.
- Kwack, Sung Y., and Un Chan Chung. 1986. "The Role of Financial Policies and Institutions in Korea's Economic Development Process." In *Financial Policy and Reform in Pacific Basin Countries* ed. Hang-Sheng Cheng, pp. 115-135. Lexington, MA: Lexington Books for the Federal Reserve Bank of San Francisco.
- Lichtenberg, F., and G. Pushner. 1992. "Ownership Structure and Corporate Performance in Japan." NBER Working Paper no. 4092.
- Ministry of Finance, Japan. Various issues. *Quarterly Report of Incorporated Enterprise Statistics*. Tokyo, Japan.
- Nam, Sang-Woo, and Dong-Won Kim. 1993. "The Principal Transactions Bank System in Korea and Its Comparison with the Japanese Main Bank System." Paper prepared for the Conference at Stanford University for the joint research project on the Japanese Main Bank System and its Relevance for Developing Market and Transforming Socialist Economies (April) Stanford University.
- Sheard, P. 1989. "The Main Bank System and Corporate Monitoring and Control in Japan." *Journal of Economic Behavior and Organization* 11, (May) pp. 399-422.
- _____. 1985. "Main Bank and Structural Adjustment in Japan." *Pacific Economic Papers* 140. Canberra: Australian National University.
- Stern, Joseph, J. Kim, Dwight Perkins, and J. Yoo. 1992. *Industrialization and the State—The Korean Heavy and Chemical Industry Drive*. Cambridge: Howard Institute for International Development and Korea Development Institute, Seoul.
- Suzuki, S., and R. Wright. 1985. "Financial Structure and Bankruptcy Risk in Japanese Companies." *Journal of International Business Studies* 16, pp. 97-110.
- Suzuki, Yoshio. 1980. *Money and Banking in Contemporary Japan*. New Haven: Yale University Press.
- The World Bank. 1993. *The East Asian Miracle*. New York: Oxford University Press.